

Comparative Study to Evaluate Effect of IV Dexmedetomidine in Attenuating Hemodynamic & Recovery Responses During Extubation in General Anaesthesia

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Abstract: *The prospective randomized comparative study was done to evaluate the effect of iv dexmedetomidine over hemodynamic and airway reflexes during extubation following various Surgeries under General Anaesthesia, study is randomized case control clinical trial with double blind method carried out in Ramkrishna CARE hospital Raipur (CG) during nov.2014-nov.2015, All the patients were observed for Hemodynamic responses – HR, SBP DBP, respiratory parameters i.e. RR and SpO2 and Airway reflexes – coughing, breath-holding, laryngospasm and bronchospasm at extubation. The increase in mean heart rate, blood pressure as a result of reflex sympathoadrenal stimulation due to laryngoscopy and extubation is much higher in control group in comparison to dexmedetomidine group, no episode of desaturation were observed in both the groups, no significant change in respiratory rate were observed between both the groups.*

Keywords: Dexmedetomidine, Attenuation, Hemodynamic Reflexes, Airway Reflexes, Extubation

1. Introduction

Endotracheal intubation was introduced by O' Dwyer, in 1885 by a blind approach. After the introduction of laryngoscopy by Chevalier Jackson in 1906, anaesthesia through endotracheal intubation is being practiced.

Intubation and extubation are associated with sympathoadrenal stimulation, increased secretion of catecholamines, coughing agitation and laryngospasm which can result in hypertension, tachycardia, tachyarrhythmias, increased intraocular and intracranial pressures, bronchospasm. Although the incidence of hemodynamic and respiratory complications were significantly higher after tracheal extubation as compared to during induction of anaesthesia & tracheal intubation, not much work has been done to attenuate the endotracheal tube induced stress response and emergence phenomena after general anaesthesia. During tracheal extubation stimulus which affects hemodynamic changes are multifactorial like, light plane of anaesthesia, pain at surgical site, emergence from anaesthesia or tracheobronchial irritation and reflex sympathetic discharge caused by epipharyngeal & aryngopharyngeal stimulation leading to tachycardia, hypertension, with or without arrhythmias.

This transitory rise in pulse rate and blood pressure are probably of little consequence in ASA grade I or II patients but are a matter of concern in patients with cardiovascular diseases like hypertension and coronary artery diseases, because this may lead to complications like angina, myocardial infarction and left ventricular failure due to dangerous increase in myocardial oxygen demand. Sudden increase in arterial pressure may lead to increase in both cerebral blood flow and intracranial pressure which may result in either herniation of brain contents or decrease in cerebral perfusion pressure, leading to cerebral ischemia,

similarly rise in intraocular pressure may be hazardous in patients operated for glaucoma. Such stress responses may induce postoperative hemorrhage and potentially fatal cervical hematoma after thyroid surgery.

Hence this study was conducted to evaluate the effect of intravenous bolus dose of dexmedetomidine in attenuation of airway reflexes and hemodynamic responses during endotracheal extubation following general anaesthesia.

2. Literature Survey

Emergence phenomena observed at the time of extubation is frequently associated with dangerous patient movement, hypertension, tachycardia, arrhythmias, myocardial ischemia, surgical bleeding, laryngospasm, bronchospasm, and increase in intracranial and intraocular pressure. To ensure smooth emergence from general anaesthesia a reliable technique for improving endotracheal tolerance would be desirable in all the situations more so in neurosurgical, ophthalmic and vascular surgeries, patients with irritable upper respiratory tract, coronary artery disease, oral surgeries and paediatric population. **Arun V. Bidwai, Theodore H. Stanley, Vanamala A. Bidwai**^[1] in 1978 conducted a study to investigate and compare BP and PR responses to extubation during light general anaesthesia with or without lidocaine topical anaesthesia of the trachea in 50 patients of ASA Grade I and II. **Bidwai A V, Bidwai VA, Rogers CR, Stanley TH**^[2] in 1979 studied blood pressure and pulse rate responses to endotracheal extubation with and without prior injection of IV lidocaine in 80 ASA Grade I or II patients who were undergoing elective orthopaedic, general surgical and gynaecological operations. **Muzzi DA et al**^[3] in 1990 compared the IV "labetalol and esmolol in control of hypertension after intracranial surgery" **Nishina K, Mikawa K, Maekawa N et al**^[4] in 1995 conducted a randomized double-blind study "Attenuation of

cardiovascular responses to tracheal extubation with diltiazem” 80 ASA Grade I patients undergoing elective gynecological surgeries. *Mikawa K, Katsuya MD, Nishina et al* [5] in 1996 compared the effect of IV injection of verapamil (0.05 mg/kg or 0.1 mg/kg) with IV diltiazem (0.2 mg/kg) on cardiovascular changes during tracheal extubation and emergence from anaesthesia in 80 ASA Grade I patients,

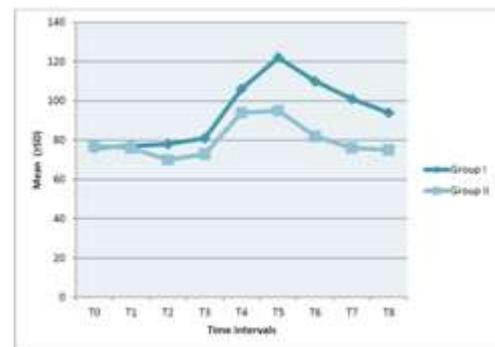
3. Methods

Study was carried out as a prospective randomized comparative study on 60 patients of ASA grade I, II, divided into two groups, of age between 20-50 years of both sexes. Males and nonpregnant females of ASA grade I, II aged 20-50 years undergoing for various surgical procedures in general surgery, urosurgery, neurosurgery and orthopaedic procedures under general anaesthesia were selected. Patients outside the above mentioned age group, Pregnant or lactating mother, Patients allergic to the drug, patients weighing >20% of the ideal body weight, patients with severe hypovolemia, patients receiving methyl Dopa, clonidine, β -blockers, Benzodiazepines, MAO inhibitors, patients with H/O Hypertension, Ischemic heart disease, Aortic stenosis, LVF, AV Conduction block. Patients with H/O cerebrovascular accidents, severe hepatic and renal diseases, Asthma, COPD and diabetes, All contraindications to general anaesthesia were excluded from the study. Proper preanaesthetic checkup of all patients, All routine investigations like CBP, Urine (R & M), Blood urea creatinine, Blood sugar, ECG, & Relevant specific investigations were done, written and informed consent before participation in study will be taken. All patients were randomly divided into two groups (Group I, II) each of 30 patients. Demographic profile were comparable in both groups. Group I received 100 ml normal saline 15 min. before the end of surgery, Group II received Injection Dexmedetomidine 0.75 μ g/kg of body weight diluted in 100 ml normal saline 15 min. before the end of surgery, pt received General Anaesthesia with standard agents with standard protocols given, and were monitored for HR, SBP, DBP, RR, SPO₂, cough, RAMSEY [6] sedation score scale, All study data taken at following time- T₀ – Basal value, just before the study drug, T₁ - 1 min. after drug administration, T₂ – 3 min. after drug, T₃ - 5 min. after drug, T₄ – during extubation, T₅ – 1 min. after extubation, T₆ – 5 min. after extubation, T₇ – 10 min. after extubation, T₈ – 30 min. after extubation. all data taken in MEAN value, statistical analysis were done by paired t-test. P > 0.05 was taken as statistically not significant, p \le 0.05 was taken as statistically significant, while p<0.01 was taken as statistically highly significant.

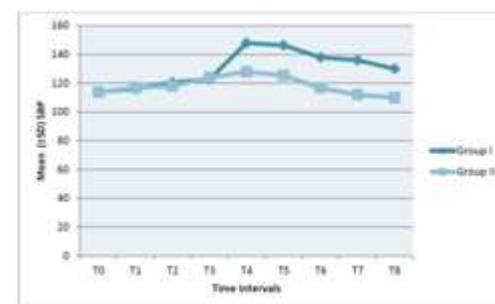
4. Results

The various patients in the two groups were comparable with regards to age, sex and weight there is no any statistical significance between two groups on these demographic datas. The increase in mean heart rate during extubation is much higher in control group in comparison to dexmedetomidine group. At the time of extubation this was 106 \pm 4.89 in group I while in group II it was 94 \pm 3.58 (P <0.01) it shows that change in mean HR is effectively attenuated by inj. Dexmedetomidine. Rise in blood pressure

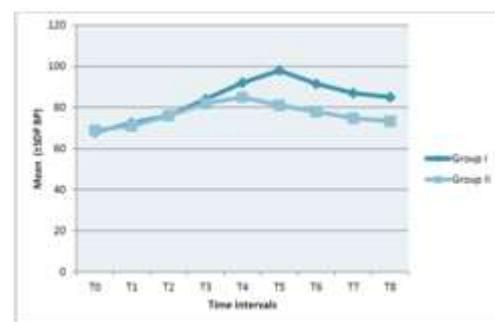
as a result of reflex symathoadrenal stimulation due to laryngoscopy and extubation was significantly higher in control group I. The mean SBP in group I is raised to its maximum during extubation (T₄) which was 148.46 \pm 6.3 while in group II It was raised up to 128 \pm 6.2 at the time of extubation (T₄), (P <0.01). Similarly change in DBP was maximum for group I it was raised to its highest at 1 min. after extubation(T₅) it is 98 \pm 4 whereas in group II it was on its highest 85 \pm 3.3 at the time of extubation(T₄), (P <0.01). Thus the rise in blood pressure during and after extubation is effectively controlled by inj. Dexmedetomidine. There is no any episode of desaturation were observed in both the groups and also in respiratory rate there is no any significant difference were observed between both the groups,(P >0.05). The incidence of cough is also lower in dexmedetomidine group, only 6.6% patients had mild cough at extubation, and 93.34% did not cough at all after extubation, while in group I 26.67% patients had mild cough and 6.67% had moderate cough. In group I all patients were remained anxious and agitated after extubation while in dexmedetomidine group 76.66% patients responded to commands after extubation and 16.66% patients were cooperative, oriented and calm after extubation.



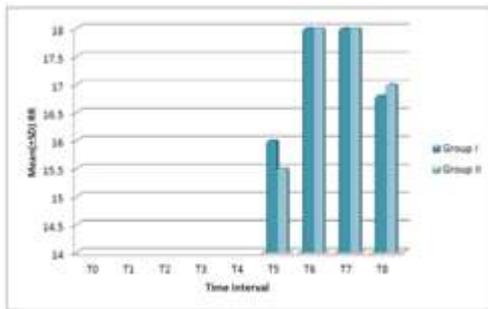
Graph 1: Mean (\pm SD) Heart rate in both study group



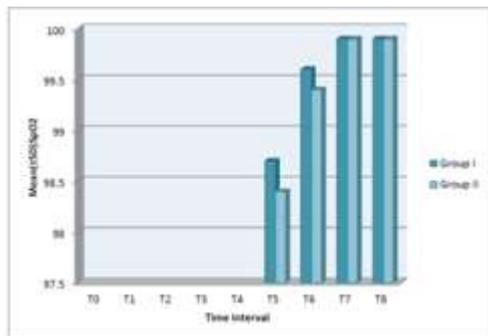
Graph 2: Mean (+ SD) Systolic Blood Pressure in both study group



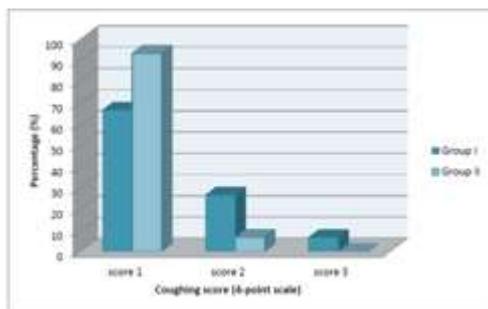
Graph 3: Mean (\pm SD) Diastolic Blood Pressure in both study group



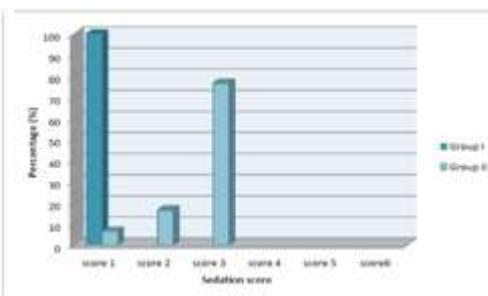
Graph 4: Mean (\pm SD) Respiratory Rate in both study group



Graph 5: Mean (\pm SD) SpO2 in different study group



Graph 6: Coughing score after extubation



Graph 7: Sedation score after extubation

5. Conclusion

On the basis of present study the following conclusions are being drawn: There is an abrupt rise in all hemodynamic parameters during and after extubation was observed, airway reflexes were also triggered during and after extubation in the form of cough. Iv dexmedetomidine 0.75 μ g/kg 15 min. before extubation is found very effective in attenuating these airway and hemodynamic reflexes without causing any untowards side effect or any other specific complication.

6. Future Scope

Extubation response is having very deleterious effect especially in neurosurgery, ENT surgeries, ophthalmic surgeries, and surgeries of patients having ischemic heart disease, hypertension, so this is very essential topic for research which can help such populations of patients especially in perioperative period for better surgical outcome which will improve patient prognosis. and also we can provide a pleasant experience of surgery to the patient by avoiding stress during extubation following general anaesthesia.

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